

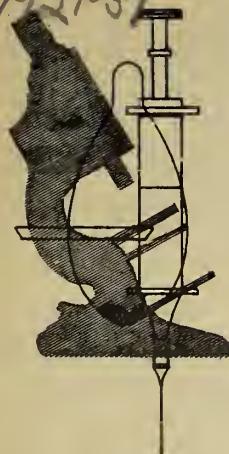
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# Penicillin, New Medical Ally

*(This article has been prepared to answer many of the questions asked by the general public with reference to this remarkable new drug. This article has been checked with numerous authorities to insure accuracy.)*

Whenever a new chemical or medical discovery shows initial promise of doing a great deal of good for the human race--the medical men and the scientists mentally keep their fingers crossed and show a natural reluctance to talk very much about the new discovery. This attitude has been forced on them through sad experience--with "cures" and "remedies" and "treatments" and "medicines" that failed to live up to their initial promise--or the early enthusiasms of incomplete knowledge.

Penicillin, the new so-called "miracle healer" has been the latest drug product of medical science to achieve the dual reception of great enthusiasm--and guarded scientific comment. This has resulted in a considerable amount of confusion so far as the general public is concerned--a public that wants the basic facts on Penicillin--as known today.

In nontechnical language, this article presents those facts--as known up to the present. And at the same time--here's a warning:

## New Knowledge

New knowledge about Penicillin is being acquired so swiftly, that within a very short time--some of the things said here will be outdated.

The first scientific work done in the field which led to the discovery of Penicillin occurred in 1929. Dr. Alexander Fleming, a distinguished English scientist was responsible for the initial clues. He was working in

his laboratory with "cultures" of various "germs." These were cultivated on little dishes of beef-broth flavored agar (a type of jelly). One day, while inspecting the growth of some of his "bug" colonies, he noticed that in one of the dishes of gelatin, a small area had been cleared of germs. However, growing happily in the center of the cleared area, there was a mold growth.

Dr. Fleming was intrigued with this happening--and identified the mold as a "Penicillium" (brush-like mold). His findings were eventually made the subject of further study by a group of other English research workers, including Drs. H. W. Florey, N. G. Heatley, and E. Chain.

By 1940, they had definitely proved that they could get the mold, "Penicillium Notatum," to grow in the midst of a number of "bugs" or "germs" or micro-organisms that caused a great deal of illness to mankind. It was also discovered that something about this strange mold had a tremendous inhibiting power over a number of these harmful "bugs."

One of the first difficult problems was to discover whether the mold itself--or some byproduct of the mold kept the germs from growing. Experiments proved that it was not the mold itself--but a byproduct which was responsible for preventing the growth of the germs.

## Quantities Limited

Drs. Florey and Chain managed to obtain small amounts of the germ

inhibiting substance from the material on which they had grown the mold, "Penicillium Notatum." Dr. Fleming had given to this germ-inhibiting material the name "Penicillin" at the time of his discovery in 1929. The amounts of Penicillin they obtained were pitifully, heartbreakingly small. The processes of growing the mold and extracting the Penicillin were long, expensive, slow, and unsure.

Florey set up a Penicillin "standard" called an "Oxford Unit." This was the amount of Penicillin required to clear a measured area of a certain type of germ. Experiments indicated that up to 2 to 3 million "Oxford Units" of Penicillin might well be required to effect the cure of certain human diseases for which Penicillin seemed effective. However, Florey found that he could get just about 2 units of Penicillin from 1/30 of an ounce of broth in which he grew his mold. Thus to get 2 or 3 million units of Penicillin to cure a single patient--would require the processing of 1,100 to 1,850 quarts of liquid on which Penicillium Notatum had been grown.

### Came to America

The Englishmen kept at this heart-breaking and expensive production problem--with relatively little success. In July 1941, Dr. Florey and Dr. N. D. Heatley were brought to the United States and arrangements were made for Dr. Heatley to work cooperatively with the U. S. Department of Agriculture Northern Regional Research Laboratory at Peoria, Ill.

This laboratory had been working with mold chemistry and fermentation problems for some years--and it was thought that if there were any devices or tricks or methods that could be used to grow Penicillium Notatum faster, stronger, and cheaper--the Northern Regional Laboratory could probably help to furnish the methods. This belief was borne out by results. Northern

Regional Laboratory did furnish methods that increased the yield of Penicillin manyfold. The work of that laboratory and of the laboratories of several commercial firms has resulted in an increase in the yield of Penicillin more than 100 times.

### Commercial Manufacture

A number of leading drug manufacturers were also invited to cooperate on this production problem--and the manufacturing problem. The Office of Scientific Research and Development and the War Production Board, in their respective fields, did extraordinarily effective work in making Penicillin more quickly and more generally available for medical usage. Federal assistance was provided to coordinate research and to speed up commercial manufacture. Today, vastly greater supplies of Penicillin are available than were available only a few months ago--and still larger supplies are in prospect. There is also the constant hope (not yet realized) that chemists will be able to create Penicillin artificially--or synthetically--and thereby make it available in vastly greater amounts.

The natural question arises--why do we want so much Penicillin? What is it good for? Frankly, the drug is so new, that no one can give a complete answer to the question, "What is it good for?" with very much authority. But already medical men know so many things it is helpful in treating or curing--that tremendous amounts of it can be used--with great benefit to the human race--right now.

### Uses of Penicillin

Some of the things that have yielded almost magically when Penicillin has been used include a very severe type of pneumonia, some types of meningitis, osteomyelitis (bone disease), many kinds of "blood poisoning," syphilis, and gonorrhea. As the bacteriologists put it, Penicillin seems to have a remarkable

inhibiting effect on almost all bacteria classified as "Gram Positive." It also inhibits the "Gram Negative" bacteria, meningococcus and gonococcus.

The great advantages of using Penicillin--where it is effective--are due to the facts that its action is very positive, very speedy, and "nontoxic."

Cures have been effected with Penicillin in a few days--to a few weeks--of conditions that were heretofore incurable--or curable only over a much longer period--with much greater suffering to the patient. So far, it appears that there simply aren't any really, unfavorable reactions to medicinal dosages of Penicillin. Many people, as is widely known, have mild--to extremely severe reactions to the various sulfa drugs. In not a few cases, these reactions--or toxic symptoms--are so severe that sulfa drugs cannot be used. With Penicillin, there just simple aren't any similar reactions or "kick-backs."

### Method of Dosage

For the various ailments in which it is used, Penicillin is either injected (vein or muscles or nerve channels) or it is placed in surface contact with a wound. It is not a medicine that can be effectively taken orally--or introduced rectally. When injected (the most common method of dosage), it goes quickly into the body--and is quickly eliminated through the kidneys. Most doses will be almost entirely eliminated within 2 or 3 hours. This means that, in most types of Penicillin medication--doses must be given every 2 to 4 hours.

The commercial product, Penicillin, of today is sealed in glass vials. The most frequent size is the "100,000 Unit Ampoule." Depending on the manufacturer, 100,000 units in the vial are between 1/4 and 1/3 of a teaspoonful of very dry powder. The powder ranges in shade from a light coffee color to a light yellow. Some "entirely pure" Penicillin

has been produced--at great cost--that is white, like salt. To use the Penicillin, solutions are made of this powder--usually a saline solution or a 5 percent dextrose solution. The solution is unstable and must be used within 24 hours to be most effective. It is recommended that even the unopened glass ampoules be stored at about 41 degrees F. or below.

### Costs Are Falling

While no absolute information can be given as to the exact number of units of Penicillin needed to treat any particular case--it can be said, that most cases will require from about 120,000 Oxford Units to 3,000,000 Oxford Units. Merely as an example, with pneumococccic pneumonia the dosage schedule is, tentatively--"between 60,000 and 90,000 units a day for 3 to 7 days."

At the present time, the commercial cost of Penicillin--for those to whom it can be made available--is about \$4 to \$5 per 100,000 units. Only a very few months ago the cost was \$20 to \$25 per 100,000 units. It seems likely that further price reductions will be made in the future.

While Penicillin has performed--and will continue to perform--"cures" that are miraculous both to the layman and the medical man--it must be clearly understood that PENICILLIN IS NOT A CURE-ALL--AND THERE ARE NUMEROUS PHYSICAL CONDITIONS THAT IT DOES NOT AND WILL NOT CURE.

### New Uses in Prospect

New uses will assuredly be found for this new drug--but already, it is definitely known that it is of no value in the treatment of leukemia, tuberculosis, typhoid fever, common colds, rheumatism, diabetes, Bright's disease, and arthritis. To quote from a National Research Council Summary: "Penicillin

has also been found to be an effective agent" in the treatment of bacterial endocarditis (a heart disease)--"but its position has not been definitely defined." Further clinical use MAY reveal how Penicillin can be made more effective in bacterial endocarditis.

So great is the need for this drug today--for treatment of ailments where it is KNOWN to be effective--and so limited is the supply--that less experimentation is being made than would be made if the supply were larger.

The need for Penicillin for the Armed Forces of the United States--is so great, in relation to its supply, that the drug CANNOT BE OBTAINED ON AN UNRESTRICTED BASIS FOR THE TREATMENT OF CIVILIANS. Due to its scarcity and the needs of the Armed Forces, Penicillin will be made available for civilian use only when very special circumstances warrant.

### New Distribution Plan

At present writing, 1,000 hospitals throughout the Nation are being used as "depots" for the distribution of the restricted quantities of the drug that can be made available for civilian use. It is emphasized that the quantities are distinctly "limited" and relatively

few persons who might be benefited from treatment with Penicillin will be able to obtain it at present. If, however, it is believed by the doctor attending a patient, that the use of Penicillin on a patient may advance medical knowledge or may be a "last resort" in saving a patient--there is a possibility that the drug will be made available.

If inquiry by the DOCTOR (not the patient) reveals that a local hospital is not a "Penicillin depot"--and if supplies are not immediately available--the DOCTOR (not the patient) should get in touch with the WPB Office of Civilian Penicillin Distribution, 226 West Jackson Boulevard, Chicago, Ill. The doctor should furnish full particulars of the patient's illness and need for Penicillin--and, possibly, it can then be made available. Only the applications of fully accredited M. D.'s can receive consideration. Patients who require--or think they require--Penicillin should NOT make direct application for the drug--as such requests cannot be given consideration.

This new drug does bring new hope for the treatment and cure of many serious human ills--even at this early stage in its development--but again, it is stressed--PENICILLIN IS NOT A CURE-ALL FOR EVERYTHING!

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